

THERE IS CLAIMED:

1. A selection module for use in an optical signal switch, said module comprising a spatial selector comprising:
 - a plurality of inputs each receiving a wavelength division multiplexed optical signal comprising a plurality of channels each associated with a separate wavelength,
 - an output delivering a single signal selected from said plurality of wavelength division multiplexed signals, and
 - a plurality of spectral selectors each selecting a channel from a plurality of channels of said signal selected by said spatial selector.
2. The selection module claimed in claim 1, further comprising a first optical coupler having an input connected to said output of said spatial selector and a plurality of outputs each connected to an input of one of said spectral selectors.
3. The selection module claimed in claim 1 wherein said spatial selector comprises:
 - a second optical coupler having a number of inputs equal to the number of inputs of said spatial selector and one output, and
 - a plurality of optical switches each associated with one of said inputs of said optical coupler and each having an input that constitutes an input of said spatial selector and an output coupled to said associated input of said second optical coupler.
4. The selection module claimed in claim 3 wherein said optical switches of said spatial selector are semiconductor optical amplifiers.
5. The selection module claimed in claim 1 wherein each of said spectral selectors comprises:
 - a demultiplexer comprising an input receiving said signal selected by said spatial selector and a plurality of outputs,
 - a multiplexer comprising a plurality of inputs and an output supplying the signal associated with a channel selected from a plurality of channels of said signal selected by said spatial selector, and
 - a plurality of optical switches each comprising an input connected to an output of said demultiplexer and an output connected to an input of said multiplexer.
6. The selection module claimed in claim 5 wherein said optical switches of said spectral selector are semiconductor optical amplifiers.

7. The selection module claimed in claim 1 further comprising an optical amplifier for amplifying said signal selected by said spatial selector and having an input connected to the output of said spatial selector.
8. An optical signal switch adapted to receive a plurality of wavelength division multiplex input signals and comprising output ports supplying wavelength division multiplexed output signals each comprising a plurality of channels each associated with one wavelength, each of said input signals comprising a plurality of channels each associated with one wavelength, and said switch comprising a broadcast stage comprising optical couplers associated with respective input signals, each optical coupler receiving at its input said associated input signal and broadcasting said signal toward a plurality of output ports, and a selection stage comprising a plurality of outputs, and a plurality of selection modules each having L inputs, said plurality of selection modules comprising means for selecting at one of said outputs one of said channels associated with one of said broadcast input signals, in which switch said selection stage comprises at least one selection module as claimed in any preceding claim.
9. The switch claimed in claim 8 wherein said at least one selection module comprises n outputs each assigned to selecting one channel from a plurality of channels of said signal selected by said spatial selector, where n is an integer greater than 1 and less than $C_e/P_s + 1$.
10. The switch claimed in claim 8 wherein each of said P_s output ports is associated with u_k modules each comprising k outputs each selecting one channel from a plurality of channels of said signal selected by said spatial selector, C_e being an integer multiple of P_s greater than 1, k varying from 1 to C_e/P_s , and u_k being defined by the equation:

$$u_k = E\left(\frac{C_s - v_k - L.(k-1)}{k}\right) + (C_s - v_k - L.(k-1)) \text{ modulo } [k]$$

$$\text{where } v_k = v_{k+1} + k.u_k \text{ and } v_{\frac{C_e}{P_s}} = 0,$$

the operator E() designating the integer part function and the u_k modules being modules as claimed in any one of claims 1 to 6 for k varying from 2 to C_e/P_s .

11. The switch claimed in claim 8 comprising P_s multiplexers each comprising C_s inputs and one output connected to one of said P_s output ports.